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ABSTRACT

Systematic observations of thousands of high school students in the California Mentally Gifted Minors/Gifted and Talented Education programs identified five principles underlying the development of high level thinking skills in this population: (1) Exceptional performance on any criterion requires mutually reinforcing antecedents, the effects of which cumulate. (2) The more background factors a growing child has that require constant sensing of what is immediately present (such as ghetto living) the lower that child's IQ score is likely to be. (3) Differences in student style predict score profiles on test batteries and are themselves predictable from a set of interacting demographic factors. (4) When mental functions conflict, some will inhibit others, creating cleavages in human potential. (5) For people's minds to function, there must be higher order integration skills to bridge opposing systems. A three-dimensional classification system for adaptive learning is offered which predicts that IQ scores should not correlate highly with measures of creativity. (DB)

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The GATE Way to Equity

Helene F. Belz, Ph.D.

February 7, 1988

This table talk is about an unheralded contribution by the* MGM/GATE program to the goal of equity in education. I refer to a massive opportunity to study mental and cultural characteristics of thousands of high achieving scholars that would hardly have happened had we not been evaluating candidates for this program.

Twenty-five years ago, the California MGM program was created as a "cold war emergency" measure. But high schools, already oriented toward a "different" curriculum for university-bound students, used MGM resources mainly to help the most favored among them to become even more the way they were already. MGM then became GATE in 1980 due to concerns over ethnic bias. Meanwhile, our industrial base has eroded, ethnic statistics are worsening, youths in greater numbers seem to be embracing self-ruinous pleasures, and national treasure is pouring into hideous weapons at $9000 per second.[1] Is it surprising that legislators ask what kind of talent development was achieved, or whether MGM/GATE programs have even addressed urgent national concerns?

In answer, more than our teaching them, the "identified gifted" have taught us about the demands that academic disciplines place on students' minds, and shown us cultural antecedents of the mental skills they need. We believe that if free societies are to live, teachers must be able, purposefully, to bring the mental skills of diverse groups of young citizens to a more sophisticated level than now seems to occur by chance. How else will we break through barriers to enable the young to cope with a global economy that transcends national boundaries, to govern themselves peaceably amid cultural diversity, or to preserve the earth's biosphere for generations to come? Knowledge about the many ways people use their minds "intelligently" prepares educators for such responsibilities.

The mental skills I refer to are those that enable scholars of all races to share learning and ideas across diverse languages and cultures. So consistently do these skills frame and formalize thinking in literature, political documents, research and business that we can even decipher dead languages and surmise thoughts of long-gone people from symbolic materials they left behind.

Throughout history, an abundance of such skills marked exceptional persons who surfaced from time to time, often seemingly from nowhere. As if such "giftedness" were gold, test-makers have long searched for a "true" measure of it, many a parent has hoped it will bless his or her child, and as with gold, there have always been educators who dreamed that, by some alchemy, they could develop it where it did not seem to exist before.

*Mentally Gifted Minors/Gifted and Talented Education

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Going back only twenty-five years, "giftedness" was seen as inborn and defined primarily by high scores on sacrosanct IQ tests. But even then, findings such as the higher number of oldest children who turned up "gifted," made it obvious that "IQ" reflected cultural antecedents. Some people still talk of "IQ" and inborn "intelligence," and they are at impasse with other people who argue that, if heredity is responsible for IQ scores, then the tests do not address their kind of intelligence.[2] But this controversy is outdated because the IQ concept is disintegrating. Trying to measure so amorphous an idea as "intelligence" is Quixotic, like trying to measure "love."

Meanwhile, systematic observations of thousands of high school students showed us that people draw from a wide spectrum of mental skills when they are challenged. No knowledgeable person now disagrees that it takes many kinds of mental skills to adapt "intelligently" to the things and happenings that enliven us. Each new "multiple intelligence" taxonomy also brings a new way that "giftedness" might be defined. The question has really become, "gifted for what"?

The notion of "giftedness" as a set of skills adapted to the school setting grew out of Binet's work.[3] As we all know, he selected for his test only those school-type tasks on which some students performed much better than others. Thereby, he assembled an array of abstract thinking skills which, thanks to the MGM/GATE program, we were privileged to study under relatively "pure" conditions. I say "pure" because the Stanford-Binet uses only abstract symbolic items at levels appropriate for testing high school "gifted" students. All answers at that level require the student to use internal mental skills. What Binet then combined as a "measure" of academic potential for his "intelligence quotient," we can take apart for inventory of separate skills.

Binet's goal was to sort people for placement in school. As he pursued that end, he did not ask what creates the skills that fit a child for schooling. Nor did he determine why some people came to school with more of them than others, or what alternative skills the others use for survival if they are, indeed, less "intelligent." But we did ask those questions because of concern over inequities that such sorting produced. Seeking answers, we recorded background data with every test, catalogued skills, and analyzed the patterns we found. The insights we gained during years of work on item responses show need for a new level of professionalism in teaching. Today's increasing inequities prove that teachers are not at that level now. Schools are still the same sorting institutions that they were in Binet's day. So, call it alchemy, perhaps, but to be truly professional, teachers must understand the mental processes they are dealing with well enough to help those students who want to learn thinking skills that their backgrounds do not foster.

Five powerful principles that seem consistent enough to be called "laws" have emerged from this work:

The first "law" relates to exceptional performance. If social science has laws at all, one is that exceptional performance on any criterion

requires mutually reinforcing antecedents, the effects of which cumulate.[4] Be it remembering dates, building models, calling names, or enjoying Brussel sprouts, many people will do so infrequently or not at all, and a few people will do so a lot! The distribution of people will usually form a curve that is skewed at the high performance end.

Now, if one collects criterion-related tasks that are most often done by only a few people in a given setting, as Binet did, then exceptional performance on that criterion by those same people, and those like them, is quite certain. The tracks that individuals take toward the criterion will show a convergence of factors that complement each other as the points on the curve become more extreme. "Far out" is no meaningless term! In sorting for an extreme, one does not need to ask about those who are not "far out." But if one is concerned about equal educational opportunity, one must ask what non-"gifted" people are doing instead.

Our findings on this question produced a second "law."[5] It refers to the real, external world. We found that the more background factors a growing child has that require constant sensing of what is immediately present (e.g., manually oriented occupations, ghetto living, etc.) the lower that child's IQ score is apt to be. When we tested students who were picked for high motivation to achieve academically, but whose "academic talent" was only "average," we found that they answered scattered items all the way to the top of the Binet test, but not nearly as often as their exceptional peers. Ability for abstract thought clearly was not the issue. Rather, not enough of their background determinants required (or allowed) internalized habits of abstract thought to develop. For those students, many test items evoked other kinds of skills that were more devoted to guidance from "outside" the student's mind. Such "externally-oriented" uses of the mind do not serve students well on academic tasks. We observed, further, that few of those students came from background settings where habitual use of internalized abstract thought was vocationally and socially essential.

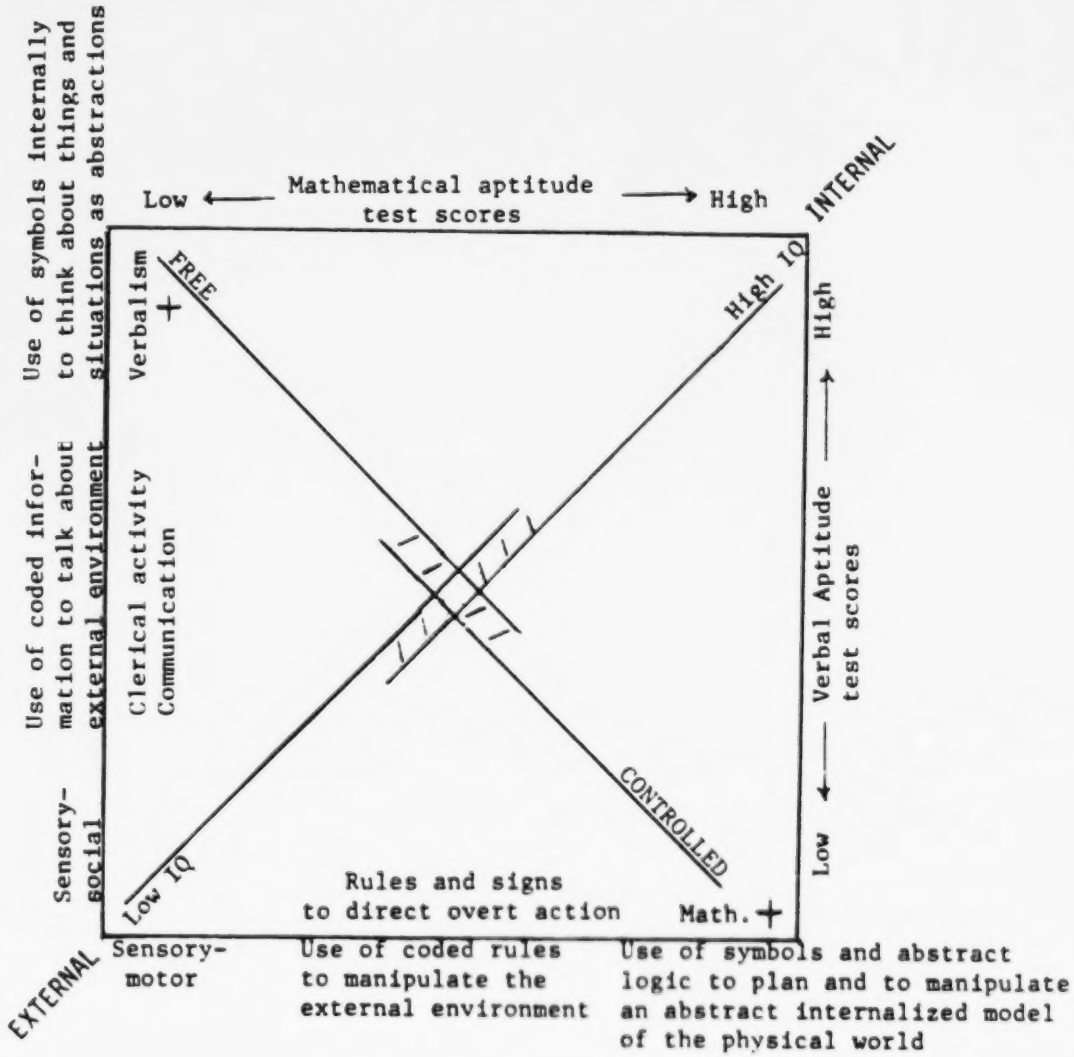
Our third "law" of mental functions also came from analysis of test responses and their antecedents. Some students seemed to think, habitually, in more controlled, dynamic, action-related terms as compared to others who clearly thought more of diverse images of things and situations, with less sense of time, order, or relationship. We found this style dimension to be quite a stable predictor of score profiles of students on test "batteries" (e.g., SAT Verbal/Math, achievement tests, etc.). We also found these styles to be predictable from a set of interacting demographic factors, none of which was much of a predictor in itself, but which could cumulate, according to "Law #1," to produce extreme differences among individuals. The "style" dimension that these combined demographic variables predict is shown in the diagram that follows. Compared to "Law #2," which clearly relates to social class and occupational level, "Law #3" has much in common with personality dimensions explored by Freud and Cattell,[6] among others. Its connection with aptitudes for the academic disciplines, and its relation to the physical and social environments in which children grow are sketched in broadly.

THE STYLE DIMENSION

	DIVERGENT THOUGHT		CONVERGENT THOUGHT
	DIVERGENT V Free Association	← V →	CONVERGENT V Semantic-Syntactical Controls
			Trial-and-error transformations Mathematical probabilities DIVERGENT M
			Logico-Operational controls ← M → CONVERGENT M
FACTORS:	V (V: Educ. Complex)		M (K:m Complex)
TYPE OF ASSOCIATES:	Wide-ranging, free (can be humorous or poetic).		Step-by-step progressions (always reversible).
TYPE OF ACCEPTABLE RESPONSES:	Can be free or constrained.		Always constrained.
DERIVATION OF CONTROLS:	Social convention (e.g., dictionary).		Compelling physical experience.
HOW LEARNED:	Visual and auditory-social experience initially; reading, once basic symbols and syntactical rules are mastered.		Motor experience in contact with the physical world; manipulation of abstract symbols and signs for actions once spatial and motor traces have been internalized.
USES:	Uncertain, fluid, unstable phenomena, usually social.		Stable phenomena, usually physical.
		ZONE OF COMPLEX THOUGHT Elements of both systems are integrated. The person can draw from both systems. Complex social phenomena can be dealt with in terms of probabilities (the mathematics of uncertainty). Human motives and sentiments can be projected onto pets or even inanimate objects (anthropomorphisms, animism as found in primitive religions).	
HIGH SCHOOL SUBJECTS:	Foreign Language Literature	Social Science EXPOSITORY WRITING	
		Biological Science Probability theory	Physical Science Mathematics

When we linked the polar opposites reflected in the "Freedom-versus-Control Law #3" to the pair of opposing systems reflected in "External/-Abstract Law #2," we had the diagram on the next page. We had, in fact, derived a very fundamental classification system for all the kinds of things people can do. All taxonomies of mental skills describe specific parts of this very general model.

THE TWO-DIMENSIONAL APTITUDE PLANE


Use of symbols internally to think about things and situations as abstractions
Low ← Mathematical aptitude test scores → High
INTERNAL
FREE
Verbalism +
High IQ
High
Use of coded information to talk about external environment
Clerical activity Communication
Verbal Aptitude test scores
Sensory-social
CONTROLLED
Low
Low IQ
Rules and signs to direct overt action
Math. +
EXTERNAL
Sensory-motor
Use of coded rules to manipulate the external environment
Use of symbols and abstract logic to plan and to manipulate an abstract internalized model of the physical world

For educators of the future, the fourth "law" of mental functions may be the most important. It follows from the fact that the foregoing dimensions are not "low-to-high" continuums on a single variable, but they are pairs of opposite functions. "Law #4" says that when mental functions conflict, some will inhibit others, creating cleavages in human "potential." The conditions for "culture" to develop are set up in this way. Such cleavages between incompatable clusters of mental skills underlie division of labor within human groups, both large and small, even between spouses, pairs of siblings or friends. Most people seem to rely disproportionately on one cluster of compatable skills, and pair up with others who can do what they, themselves, find hard. To recall a famous pair, Miles Standish, the "man of action," is said to have asked John Alden to speak for him.

Every scholar knows that one cannot let the mind wander while one is also trying to make it follow orderly steps. Applying that principle to our own "gifted," top algebra grades (which require powerful mental controls) rarely go with high scores on recall vocabulary (which require loose wide-ranging associations). Or look at the following examples:

A high-IQ student who habitually chooses verbs (action concepts) to define words, e.g.,

lecture	"someone talking"	often cannot think of a subject for a composition.
shrewd	"someone acting clever"	
philanthropy	"someone who gives something"	

Or: Another high-IQ student with a very rich, large vocabulary tells you that-

> To get 1 pint of water with 2 unmarked cans, you pour from a full 3-pint can into an empty 2-pint can, but "I don't see how to catch the 1 pint before it hits the ground."
> (And then confides that s/he has trouble with math!)

Our research on such opposing phenomena then led to "Law #5" and the three-dimensional model on this table. This is the "law" of complex thinking and "creativity." For people's minds to function, there must be "higher order integration skills" to bridge opposing systems. So, a vertical third dimension is needed. It represents the complexity that a person achieves (or that a given tesk requires) through integration of skills from opposing skill clusters. For an example of a higher-order integrating skill, think of Piaget's experiment with tall and flat water jars. Here are static shapes, with water at rest. When the child integrates this image with the momentary sight of moving water, s/he bridges two opposing systems. Two static images linked by an empathetic dynamic awareness create the concept of constant volume.

For much that is integrated, the links become automatic with practice. But the energy to overcome inherent conflicts is needed whenever one leaves the comfort of a preferred mode of interacting with the world, and tries to perform opposite kinds of skills. We have concluded that "creativity" is integration by persons who have at their disposal such an unusual amount of energy that they can draw freely from among opposing skill clusters.

This conclusion predicts that IQ scores should not correlate highly with measures of creativity. The reason is that a high IQ usually reflects little more than membership in a subculture that heavily reinforces internalized abstract thought, while creativity requires much more than that. Creativity is application of abstract thought to the real, external world.

The foregoing model is a classification system for all kinds of adaptive learning. It is also a model for showing how learnings needed to survive "outside" can interact with learnings needed to survive in school. It is explanatory, but not yet prescriptive for there are yet bigger problems.

One is the paradox of complexity. I.e., how does applying one's self to a task produce a more complex product? One answer may be that component parts can be performed by imitation, without understanding, and that understanding comes when elements become linked as in Piaget's experiment, by a process we have not otherwise identified.

Beyond that question, what directs the person's choice of skills s/he will select to respond to a given situation? This is the mind-force that high school teachers deal with, professionally, in more than one hundred students for five hours a day! Over centuries of experience, teachers have built a curriculum that does, indeed, bring about such complex mental development in some students. But no one knows what the executive function is by which such students use their minds as tools so purposefully.

This function is easily observed in people with trained minds (e.g., students who would usually be identified as "gifted" in high school). Others seems less aware of their own mental functions, less reflective, and more apt to be directed by the structure of the immediate external world. We observe such unawareness as a kind of "abdication," or loss of sense of self. Moreover, while the former student can shift from thoughts of distant times and places to attend to what is immediate, the latter student is not equally able to shift from the immediate to contemplate, mentally, what is not there before him or her.

The issue of educational equity lies mainly on the External/Abstract Dimension of our model. But, to date, none of the work I have reviewed indicates how a teacher can, with any certainty, overcome a student's inclination, when challenged, to turn to external awareness rather than abstract thought. It seems clear that students in whom teachers can elicit mental self-awareness (meta-cognition) during a learning task can deal with academic disciplines. Students who have not learned such self-monitoring apparently cannot. At this point, we can recognize the challenge that teachers of those children face, but no curriculum "packages" or teaching methods that I know of have overcome it.

To that end, GATE supporters will remember that the 1983 California GATE sunset report called for R&D to address the GATE mandate for effective outreach to the "culturally different." Without waiting for funding, we have built such a goal into our program. We have the data for study of the processes our "booster" GATE candidates need to develop. What is missing, so far, is time for classroom teachers to work out the methods we need. I no longer doubt that they can be created, but I am also aware that the basic model of mental processes that we need to use as a guide has to have, at least, the dimensions systematically outlined here.

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